THURSDAY, AUGUST 9, 1883

TWO "EMINENT SCOTSMEN"

James Nasmyth, Engineer. An Autobiography. Edited by Samuel Smiles, LL.D. (London: Murray, 1883.)

The Life of John Duncan, Scotch Weaver and Botanist, with Sketches of his Friends and Notices of his Times. By William Jolly. (London: Kegan Paul and Co., 1883.)

WE do not know in what particular direction Dr. Smiles has exercised his editorial functions in the charming autobiography of Mr. Nasmyth. The "pruning-knife" which the latter advised him to use freely was surely not needed; the inventor of the steam-hammer gossips so delightfully about himself that we should have been glad had he gone on to a much greater length. On the other hand it is a pity that Mr. Jolly had not obtained the services of some judicious editorial pruner. He himself has evidently not had the leisure to write briefly, and his book is therefore a somewhat heterogeneous collection of materials much in want of rearrangement and cutting down.

Mr. Nasmyth's autobiography, we venture to think, is likely to become a classic in the section of literature to which it belongs. The genial simplicity, the unconscious and perfectly just self-appreciation with which the great engineer and student of science talks of his career and his work, enlists from the first the reader's sympathy and interest. His father, Alexander Nasmyth, a painter of high rank and the founder of the Scottish landscape school, was himself a genius in mechanics; and an atmosphere of mechanical invention pervaded his happy home in Edinburgh. He was one of the select party on board Symington's steamer on Dalswinton Loch in 1788; and among his fellow-passengers was Robert Burns, a fact new to us. Mr. Nasmyth gives us a delightful sketch of his father and his happy family and the simple Edinburgh life of the time. He himself was born in 1808, and educated at the High School of Edinburgh. From his earliest years he delighted in mechanical invention, and was great at making "peeries" and toy cannon. He naturally, as his father's son, learned the use of the pencil, and insists strongly on the great value of drawing to a mechanical engineer. He himself, throughout life, has made almost daily use of his skill in this art, and by the facility with which he could record his ideas and incipient inventions in this form, saved himself much writing, and preserved much that would otherwise have been lost. He left the High School in 1820, when only twelve years of age, though afterwards he attended classes at Edinburgh University. At this early period he says of himself:—

"I was constantly busy; mind, hands, and body were kept in a state of delightful and instructive activity. When not drawing, I occupied myself in my father's workshop at the lathe, the furnace, or the bench. I gradually became initiated into every variety of mechanical and chemical manipulation. I made my own tools and constructed my chemical apparatus, as far as lay in my power. With respect to the latter, I constructed a very handy and effective blowpipe apparatus, consisting of a small air force-pump, connected with a cylindrical vessel of tin plate. By means of an occasional use of the handy pump, it yielded such a fine steady blowpipe blast, as enabled me to bend glass tubes and blow bulbs for thermometers, to analyse metals or mineral substances, or to do any other work for which intense heat was necessary. My natural aptitude for manipulation, whether in mechanical or chemical operations, proved very serviceable to myself as well as to others; and (as will be shown hereafter) it gained for me the friendship of many distinguished scientific men."

He had moreover taken part in really practical work in some Edinburgh workshops, and at the age of seventeen he was constructing small steam-engines and models for illustrative purposes, and two years later he invented a very efficient road steam-engine. The great event in Nasmyth's early life, however, was his engagement in the great engineering works of Henry Maudsley, of London, in 1829. Maudsley was, indeed, so impressed with what he saw of the young Scotchman's intelligence, knowledge, and skill, that he at once took Nasmyth into his confidence as his personal assistant. In London, as in Edinburgh, Mr. Nasmyth made many friends among those whose friendship was best worth having; through Brougham, for instance, he became acquainted with Faraday, whose friendship he retained to the end of the latter's life.

In order that he might be able to live upon his rather scanty wages, Nasmyth invented an ingenious cooking-stove, a sketch of which he gives, and by means of which he was able to cook a "capital dinner" at 4½*d*. Long before this his attention had been given to the contrivance of accurate cutting-tools, and one of the first things he did for Maudsley was to construct a nut-cutting machine. A visit to the north of England, in 1830, one of the objects of which was to see Stephenson's "Rocket," gave him the first idea of settling ultimately in business for himself in the neighbourhood of Manchester. And so indeed he did in 1832, in a very small way, for his means at the time were limited. Business rapidly increased, and he had shortly to remove to new premises at Patricroft, where in 1836 the great Bridgewater Foundry was in complete and efficient action. For twenty years after this Mr. Nasmyth continued at the head of his constantly growing establishment, adding to his inventions, and extending his operations at home and abroad. The result was that at the early age of forty-eight years he felt himself in the happy position to be able to retire entirely from business and devote his life to those scientific and artistic pursuits which had been to him a constant source of pleasure. Indeed it was his full and accurate knowledge of the science of his art, combined with his native insight and common sense, that enabled him to achieve so many mechanical triumphs.

Mr. Nasmyth naturally enters in considerable detail into the history of the steam-hammer, with which his name is so intimately associated. The conception and completion of the invention seems to have been the work of a very brief time. He was incited to it, so early as 1839, by the difficulty which Mr. Humphries, the engineer who had charge of the construction of the *Great Britain* steamship, found in finding forges powerful enough to weld the paddle-shaft of that vessel. Mr. Humphries wrote to Mr. Nasmyth on the subject, and, says the latter:—

"This letter immediately set me a-thinking. How was

it that the existing hammers were incapable of forging a wrought-iron shaft of thirty inches diameter? Simply because of their want of compass, of range and fall, as well as of their want of power of blow. A few moments' rapid thought satisfied me that it was by our rigidly adhering to the old traditional form of a smith's hand hammer—of which the forge and tilt hammer, although driven by water or steam power, were mere enlarged modifications—that the difficulty had arisen; as, whenever the largest forge hammer was tilted up to its full height, its range was so small that when a piece of work of considerable size was placed on the anvil, the hammer became 'gagged'; so that, when the forging required the most powerful blow, it received next to no blow at all, as the clear space for the fall of the hammer was almost entirely occupied by the work on the anvil.

"The obvious remedy was to contrive some method by which a ponderous block of iron should be lifted to a sufficient height above the object on which it was desired to strike a blow, and then to let the block full down upon the forging, guiding it in its descent by such simple means as should give the required precision in the percussive action of the falling mass. Following up this idea, I got out my 'Scheme Book,' on the pages of which I generally *thought out*, with the aid of pen and pencil, such mechanical adaptations as I had conceived in my mind, and was thereby enabled to render them visible. I then rapidly sketched out my Steam Hammer, having it all clearly before me in my mind's eye. In little more than half an hour after receiving Mr. Humphries' letter narrating its unlooked-for difficulty, I had the whole contrivance, in all its executant details, before me in a page of my Scheme Book, a reduced photographed copy of which I append to this description. The date of this first drawing was the 24th November, 1839."

The paddle-wheel of the *Great Britain* was, however, never forged, as about that time the substitution of the screw for the paddle-wheel as a means of propulsion was attracting much attention. Indeed, Mr. Nasmyth could get no English firm to take up his invention, and was naturally surprised to find, on a visit he made to France in 1842, that his steam-hammer was in full operation at Creuzot, M. Schneider having copied the design from Mr. Nasmyth's drawing when on a visit to Patricroft. Very naturally Mr. Nasmyth on his return to England lost no time in protecting his invention by patent; its career since is well known.

As we said, Mr. Nasmyth retired from business in 1856, twenty-eight years ago, bought a "Cottage" in Kent, a picturesque place near Penshurst, to which he gave the characteristic name of Hammerfield. Long before this he had learned to take an interest in science, especially in geology and astronomy. His investigations into the structure of the moon are well known, and these, as well as his examinations of the sun's surface, have been conducted with telescopes of his own construction. His elaborate work on the moon, with its magnificent series of views of its surface, has long been classical, and his contributions to the subject of the sun's heat are well known. His imagination, when not engaged in devising mechanical contrivances and contributing to scientific theory, has often blossomed into fancy which has found expression in exquisite pictures of fairy-land and other regions of the unseen. Altogether Mr. Nasmyth's long life has been one of almost unchequered success; from the first he has clearly seen what he wished to accomplish, and with scientific precision has devised the most effective means of realising his aims. Not the least delightful and instructive of his many works is the one before us, which we commend to the study of all young engineers, as well as to all who wish to read the story of a successful life simply and pleasantly told.

John Duncan's career, as told by Mr. Jolly, is a complete contrast to that of Mr. Nasmyth. He never rose above the humble station in which he was born, nor apparently ever wished to do so. He had all along to struggle for a bare living, and was essentially unpractical. What little education he had was self-acquired, and it was never much so far as book-learning goes. His love of flowers was a passion. He amid many discouragements managed to acquire a mastery of systematic botany, and his collection of Scottish plants, now in the possession of Aberdeen University, is of real value. Every moment he could spare was devoted to adding to his collection, and partly as weaver and partly as harvester he traversed most of his native land. In other respects he was a man of superior mind, though in no sense a genius, and by no means to be compared with Robert Dick or even Thomas Edward. Mr. Jolly has narrated in our own columns the main facts of Duncan's career. Had he been more happily situated he would certainly have done real service to science. It is some consolation to think that his merits were recognised before he died, and that his last days were surrounded with comforts and attentions to which throughout his previous life he had been a stranger. As we have said, Mr. Jolly has made too big a book of the materials he has collected, and although it abounds in interest, it would have been more creditable to his literary skill had he taken the trouble to rid it of redundancies.

THE HEAVENLY BODIES

The Heavenly Bodies; their Nature and Habitability. By W. Miller, S.S.C. Edinburgh, Author of "Wintering in the Riviera." Pp. 347. (London: Hodder and Stoughton, 1883.)

FEW subjects could be mentioned more remote from the common interests and pursuits of life than what has been usually called the "plurality of worlds," an expression now so long restricted to one well-ascertained meaning as to have lost any ambiguity that might have been charged upon it. The question is one of mere curiosity, and leads to no direct result; but it has always carried with it an attraction irrespective of its unpractical nature, and has exercised the ingenuity of so many minds that its literature is of no inconsiderable extent. To this the book now in our hands is the most recent contribution. It is not the work of an astronomer, as the author himself has informed us; but as his profession leads him to the examination of evidence this need not be considered a material disadvantage. His position, however, in this respect would have been improved by a little more care in the collection of his data, which in some instances, such as Mädler's "central sun," the satellites of Uranus and Neptune, the polar flattening of Mars, and the observations of Schiaparelli, are somewhat in arrear; and it may be the case that those more intimately conversant with the subject would estimate the